

### **REMARKS**

The Office Action of August 21, 2009, has been carefully studied. Claims 1, 2, 6, 7 and 21 currently appear in this application. These claims define novel and unobvious subject matter under Sections 102 and 103 of 35 U.S.C., and therefore should be allowed. Applicant respectfully requests favorable reconsideration and formal allowance of the claims.

### **Specification**

The amendment filed July 18, 2009 is objected to because of the introduction of new matter.

The present amendment corrects the previous amendment to the specification. It is believed that there is no new matter in the specification as presently amended.

### **Art Rejections**

Claims 1, 2, 6, 7 and 21 are rejected under 35 U.S.C. 102(b) as anticipated or, in the alternative, under 35 U.S.C. 103(a) as being unpatentable over Yamamoto et al., US 5,137,723. The Examiner has dismissed the Nishimoto declaration, alleging that PINEDEX used in the declaration does not cover "liquefied starch" as used in the herein claimed method. The Examiner's position is that "liquefied starch" encompasses all liquid compositions containing starch. The Examiner has cited BeMiller

and states that BeMiller teaches that continuing hydrolysis of starch past the maltodextrin stage yields mono- and oligosaccharides, and that there are numerous species of “liquefied starch” that are physically and chemically distinct from maltodextrin.

This rejection is respectfully traversed.

It is respectfully submitted that the term “liquefied starch” does not mean “all liquid compositions containing starch.” This interpretation of the term ignores the fact that the **starch molecules** are liquefied, not that the starch is dissolved or slurried in a liquid. To one skilled in the art, “liquefied starch” means partially hydrolyzed starch which is obtained by partially hydrolyzing starch with acids or enzymes.

In fact, BeMiller states at page 200, line 8 from the bottom as follows:

To make a corn syrup, a slurry of starch in water is mixed with a thermally stable  $\alpha$ -amylase and put through a cooker where gelatinization and **enzyme-catalyzed hydrolysis (liquefaction)** takes place [emphasis added]

It is clear that BeMiller considers “liquefaction” to be the equivalent of “hydrolysis” and, therefore, “liquefied starch” to be the equivalent of “partially hydrolyzed starch.”

Furthermore, Reference 2, *Handbook of Amylases and Related Enzymes*, submitted with the amendment filed July 8, 2009, states as follows at page 198, middle paragraph:

Liquefaction is an essential and basic process for processing of starch and if this process does not go well, various troubles such as poor filtration, turbidity of the processed solution, etc. occur. The most important factor for ideal liquefaction of starch is that the starch slurry which contains a suitable amount of  $\alpha$ -amylase is heated at 105-107°C as quickly and as uniformly as possible.

It is clear from this description that it is conventional in the field to use "liquefaction" to obtain liquefied starch, which is starch that has been hydrolyzed, not starch dissolved or slurred in a liquid.

Submitted herewith is as copy of *Handbook of Starch Hydrolysis Products and their Derivatives* edited by M.W. Kearsley and S.Z. Dziedzic, Blackie Academic and Professional, 1995, pages 30-33. Attention is directed to Figure 2.1, "Major Steps in Enzyme Conversion" at page 30, where it is clearly shown that starch slurry is converted to maltodextrin through liquefaction by  $\alpha$ -amylase. It is clear from Figure 2.1 that "liquefied starch", i.e., partially hydrolyzed starch by liquefaction, is substantially the same as maltodextrin. It should be noted that the starch slurry is not referred to as "liquefied starch"; only the starch that has been

subjected to  $\alpha$ -amylase that has been converted to maltodextrin is referred to as "liquefied starch."

Figure 2.1 further shows that "liquefaction" is a different process from "saccharification", which is conducted by glucoamylase or pullulanase to obtain mono- and oligosaccharides such as maltose, glucose, etc. That is, the further hydrolysis discussed by BeMiller is not liquefaction, but is saccharification.

It is respectfully submitted that applicant, as well as those skilled in the art, do not interpret the term "liquefied starch" too narrowly. While it is acknowledged that an applicant can be his own lexicographer, in this case "liquefaction" is a conventional term known to those skilled in the art to refer to hydrolysis of starch. It is well accepted in the relevant art that "liquefied starch" is substantially the same as "maltodextrin", which includes PINEDEX.

It is respectfully submitted that PINEDEX covers liquefied starch, and that Dr. Nishimoto's declaration definitely shares a nexus with the claimed invention.

Dr. Nishimoto's declaration clearly shows that the  $\alpha$ -isomaltosylglucosaccharide-forming enzyme used in the herein claimed process is superior to RIAGase disclosed in Yamamoto in producing 2-O- $\alpha$ -

D-glucopyranosyl-L-ascorbic acid, with minimal byproducts. Accordingly, it is respectfully submitted that the herein claimed process is novel and unobvious over Yamamoto.


**Nonelected Claims**

Applicant hereby agrees if the elected species is found allowable, to submit the nonelected species to examination. It is respectfully submitted that if the elected species is found allowable, the nonelected species should also be found allowable, because the nonelected species are saccharides that can be used as substrates in the same manner as liquefied starch.

In view of the above, it is respectfully submitted that the claims are now in condition for allowance, and favorable action thereon is earnestly solicited.

Respectfully submitted,

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